

Claims

1           1. A method for the *in vitro* growth of stem cells which comprises culturing  
2       islet cells from a mammalian species in a nutrient medium supplemented with normal  
3       serum, allowing said islet cells to grow for at least about 3 weeks, and initiating  
4       cellular differentiation into mature islet cells by refeeding said islet cell culture with  
5       a nutrient medium supplemented with normal serum.

1           2. The method, according to claim 1, wherein the islet cells are human  
2       islet cells and the serum is normal human serum.

1           3. The method, according to claim 1, wherein the islet cells are mouse  
2       islet cells and the serum is normal mouse serum.

1           4. A method, according to claim 1, wherein said nutrient medium  
2       comprises a high amino acid nutrient medium.

1           5. The method, according to claim 1, wherein the culture medium used  
2       to refeed said cell culture further comprises glucose.

1           6. The method, according to claim 1, wherein differentiation of cultured  
2       stem cells is initiated at about 4 to 5 weeks of culture growth by refeeding of said  
3       islet cell culture with the nutrient medium supplemented with homologous normal  
4       serum.

1           7. The method, according to claim 1, wherein after cell differentiation is  
2       initiated by refeeding the culture, the culture is refed at about one-week intervals

1           8. The method, according to claim 1, wherein the normal serum is  
2       obtained from the same mammalian species from which the islet cells were obtained.

3           9.     The method, according to claim 1, wherein islet-like tissue structure is  
4     produced after differentiation of said islet cells.

1           10.    An islet cell produced by the method of claim 1.

1           11.    An islet-like tissue structure produced by the method of claim 9.

2           12.    A method for producing an endocrine hormone wherein said method  
3     comprises culturing islet cells from a mammalian species in a nutrient medium  
4     supplemented with normal serum, allowing said islet cells to grow for at least about  
5     3 weeks, and initiating cellular differentiation by refeeding said islet cell culture with  
6     a nutrient medium supplemented with normal serum, and recovering said endocrine  
7     hormone from said islet cell culture.

1           13.    The method, according to claim 12, wherein said hormone is a human  
2     hormone.

1           14.    The method, according to claim 12, wherein said hormone is a mouse  
2     hormone.

1           15.    The method, according to claim 12, wherein differentiation is initiated  
2     at about 4 to 5 weeks of culture growth by refeeding of said islet cell culture with said  
3     nutrient medium supplemented with normal serum.

1           16.    The method, according to claim 12, wherein said endocrine hormone  
2     is selected from the group consisting of insulin, glucagon and somatostatin.

3           17.    A method for producing a pancreas-like organ in a mammal which  
4     comprises implanting an islet or an islet cell produced by the method of claim 1 into  
5     the tissue of the mammal.

6           18. A method for treating pancreatic disease in a mammal which comprises  
7 producing a pancreatic-like organ in the mammal *in vivo* according to the method of  
8 claim 17.

1           19. A pancreas-like organ produced according to the method of claim 17.

1           20. The method, according to claim 1, wherein the mature islet cells  
2 comprise cells selected from the group consisting of  $\alpha$  cells,  $\beta$  cells and  $\delta$  cells.

1           21. The method, according to claim 17, wherein said islet or islet cell  
2 implanted into the mammal is autologous to the mammal receiving the implant.

1           22. The method, according to claim 17, wherein the mammal is a human.

1           23. The pancreas-like organ, according to claim 19, wherein said organ is  
2 produced in a human.

1           24. A mammal having a pancreas-like organ produced according to the  
2 method of claim 17.

1           25. A mammal, according to claim 24, wherein said mammal is a mouse.